Lung Patterns: Are They Overemphasized?

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Lung Radiology

- Pattern Recognition is taught widely
  - Alveolar
  - Bronchial
  - Interstitial
    - Structured vs Unstructured

- Is Pattern Recognition the best system?
  - Fail to consider normal vs. abnormal
  - Few diseases involve one compartment
  - Can’t make diagnosis from radiograph
  - For beginners (and maybe intermediates), too confusing
  - Confession…even radiologists argue about patterns
Can It Be Simplified?

- Is the radiograph normal?
  - Yes, it is abnormal
    - Is the airspace involved?
  - Is airway sampling indicated?
“Abnormal” usually means increased opacity

These **non-pathologic** entities lead to increased lung opacity, and a false diagnosis of abnormal

- **Radiographic technique (analog)**
  - Inadequate film blackness
  - Improper contrast

- **Aeration: Atelectasis is bad**
  - Lungs *always* look worse in lateral views
  - Sedation leads to atelectasis

- **Habitus: Overlying tissue increases opacity in image**
  - Athletic breed?
  - Obese?
Effect of Ventilation
Effect of Body Condition
Lateral vs. VD/DV
Effect of recumbency
Normal

- Disease adds to normal lung opacity
- Normal will vary from practice to practice
Lung Disease

- Patterns
  - Alveolar
  - Bronchial
  - Interstitial
    - Structured
    - Unstructured

- An Alternate
  - Airway
  - Non-Airway
Why An Alternate?

- Pattern recognition overwhelms inexperienced interpreters
- Become too focused on trying to assess the pattern
  - Lose sight of patient’s problem
  - Keep it simple
- Can’t make diagnosis from radiographs regardless of system
- A key point is whether the airspaces are involved
  - Airway vs. non-airway will indicate usefulness of transtracheal aspirate or bronchoalveolar lavage
- Can still use distribution of lesions to help with diagnosis
Airway Disease

- Radiographic Signs
  - Air Bronchogram
  - Intense lung disease
    - Not a mass
  - Rings and Trams

- Many patients will have a cough or wheeze…but not always
Air Bronchogram

- Air in lung, but not bronchi, displaced by fluid or cells
- More common in dogs than cats
Air Bronchograms

Not an Air Bronchogram

What about this?
Intense Lung Disease

- **Alveolar disease**
  - Indistinct margins

- **Lung mass**
  - Distinct margins
Pulmonary edema, cat; no air bronchograms

Note intensity of lung opacification per unit area
Rings and Tram Lines

• Appearance
  ➢ Circular opacities with lucent centers
  ➢ Parallel non-tapering lines

• Some ring opacities are normal
Not Intense/Unit Area

Classic ring and tram pattern
Not Intense/Unit Area

Classic ring and tram pattern
It doesn’t matter…there clearly are abnormal airways and a TTA or BAL may be very useful in narrowing the list of ruleouts.

Is the interstitium involved?
Can’t make these diagnoses from radiographs. Consider history and signalment. TTA or BAL likely to yield diagnosis if clinically indicated to perform.

Infection  Pulmonary Edema  Metastasis

Definitely airway, but likely other compartment(s) as well

What is it?
The Process

- Normal or abnormal
- Assess signalment and history
- Start out by assessing airways
- Less stringent pattern recognition may facilitate next diagnostic step
Labrador, 13y

- Cough for one month
- Sputum occasionally blood-tinged
This is confusing, but the airways are involved!
Fel, DSH, 10y

- History of anemia
- Increased respiratory sounds
TTA?
Doubtful
Post: FIP
The End